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while the recent expedition explored the Pilcomayo for 350 miles upwards. The Rio Salado, between the Bermejo and the Pilcomayo, seems to come from the vast marshes formed by the latter between 22° 30′ and 23° 30′ S. lat. The water of the Salado is not drinkable, its banks are marshy, its breadth varies from 125 to 130 feet, and its depth averages six. On both sides are extensive forests and fine pastures. The expedition explored 20,000 square miles. The Central Chaco has an area of 41,780 square miles, and the Southern Chaco contains 60,000 square miles. There is a great variety of useful woods. The climate is reported to be healthy, the chucho or ague of Tacuman, Jujuy and other tropical regions being unknown.

OCEAN.—The *Enterprise*, Commander A. S. Barker, has run a line of deep-sea soundings from Wellington, N. Z., to the Straits of Magellan. At 118 W. long. the depth was but 1562 fathoms, the depth increasing east and west of this. This rise probably indicates a ridge from Easter island (27° 09′ S. lat., 109° 25′ W. long.) and Dougherty or Keates island (59° 21′ S. lat., and 119° 07′ W. long.). This line of soundings runs very close to the ice-limit. The *Challenger* in 1875 ran a line in about 40° S. lat., and in the same year the German ship *Gazelle* executed a series of soundings between that of the *Challenger* and that of the *Enterprise.*

The U. S. Hydrographic Office has laid out a plan by which the entire Pacific, north of the *Challenger's* line, can be surveyed by lines run at short distances apart. This will be carried out from time to time by U. S. war vessels.

GEOLOGY AND PALÆONTOLOGY.

SCHLOSSER ON THE PHYLOGENY OF THE UNGULATE MAMMALIA.[1]—We have in this memoir a comprehensive review of a subject which has received large accessions during the last decade. The discoveries made in North America and in France have given the opportunity for a summary of results, so that Dr. Schlosser's memoir is timely. The paper will prove of the greatest service to students of the subject who, for whatever reason, have not had access to all of the literature. The grasp of the subject displayed by the author is comprehensive, and his knowledge of details thorough. His immediate source of materials is the museum of the University of Munich, under the direction of the distinguished geologist and palæontologist, Professor Zittel. Besides 136 pages of text there are six well-executed lithographic plates. An appendix contains descriptions of four new genera and three new species of Artiodactyla.

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[1] Beiträge zur Kenntniss der Stammesgeschichte der Hufthiere und Versuch einer Systematik der Paar- und Unpaarhufer. Von Max Schlosser. Morphologisches Jahrbuch, Leipsic, 1886.

To the American palæontologist the greatest value of this memoir consists in its descriptions and inferences as to the history of the Artiodactyla. The materials for this study are more limited in America than in Europe.

Dr. Schlosser gives full credit to work done and conclusions reached in America. He adopts the views here proposed as to the ancestral position of the Condylarthra; and also the theory of the phylogenies of the teeth and feet of Mammalia proposed by Cope. The only defect in knowledge of American literature we observe, is the case of the report on the vertebrate palæontology of Colorado, published in the Annual Report of the U. S. Geol. Survey of the Terrs. for 1873. On this account the characters of some genera are overlooked.

There are some positions adopted by the author which we suspect that he will modify. Thus his systematic views are different from those which have been usually held, in that he uses phylogenetic series as identical with taxonomic divisions, and not, so to speak, as transverse to them. The effect of this method is to make his families not only heterogeneous, but to leave them without exact definition. This is readily seen in the case of his "family Hyracotheriidæ or Equidæ," which includes these two genera and all the forms between them. The definitions of this family which are given (p. 33) are not true of Hyracotherium. Although there can be no doubt that this genus is the ancestor of Equus, all taxonomic precision requires that it should be placed in a distinct family from that genus, and in company with genera (*e. g.*, Systemodon) which Dr. Schlosser places (p. 27) in his Tapiridæ. To illustrate this matter more precisely I give the phylogeny of Equus arranged in the family phases through which it has, in my opinion, passed, and as I have given it:

Equus	belonging to	Equidæ
Protohippus, etc. Anchitherium	"	Palæotheriidæ
Lambdotherium	"	Chalicotheriidæ
Hyracotherium	"	Lophiodontidæ

I might carry this kind of illustration through nearly all of Dr. Schlosser's taxonomy, but this example will suffice.

A principal cause of this and other diversities between the views of the author and the present reviewer, in matters of detail, is the opinion maintained by the former (p. 5) that the dentition is as important in tracing phylogenetic lines as are the feet. Of course there is no doubt as to the importance of the dentition. Nevertheless the author admits that in Ungulates the feet form the primary basis of classification, by his adoption of the divisions based on their structure, *e. g.*, Condylarthra, Amblypoda, "Paar- und Unpaarhufer." Within each of the latter he admits bunodont and lophodont forms. It is in the Condylarthra that he hesitated to admit the lophodont form Meniscotherium, and is disposed to place it in the Perissodactyla on account of its dentition; a proceeding in which we cannot agree with him. It is considerations derived from the dentition that lead Dr. Schlosser to believe that the Diplarthra have descended directly from the Condylarthra, without intervention of the Amblypoda as I have maintained. I have stated my reasons for adhering to the latter position in the last number of the NATURALIST (1886, p. 615; The Phylogeny of the Camelidæ).

In tracing phylogenies the difficulty consists in the relative valuation of characters. It is very easy, for instance, to give characters, which are only of specific value, more importance than belongs to them. The length of the bones of the feet and legs it is true have increased with geologic time in general, but it is very probable that in some groups there has been a retrogression in this respect, especially where great bulk has been attained. The line of the Amblypoda has probably had such a history, since its earliest genus, Pantolambda, is the most slender. Such has probably been the history of the Hippopotamidæ and (as to the feet) Elephantidæ. Such is admitted to have been the case with the Bovidæ, in which Dr. Schlosser regards the robust form Bos as the descendant of the slender Gelocus. Such has probably been the history of Rhinocerus, which Dr. Schlosser objects to deriving from Hyrachyus on account of the more slender feet of the latter.

There is an important discussion as to the origin of the milk dentition (p. 109). Dr. Schlosser refers to Baume's hypothesis that the temporary dentition consists of those teeth which have been thrown out of the regular series by the contraction of the regular series. A preferable hypothesis is that of Wortman, which regards the mammalian dentition as following a law of succession fundamentally that of the reptilian, the reduction consisting in nothing but anteroposterior members.[1]

I add that Elasmotherium is much more probably derived from Cœlodonta than from Aphelops. Also that the American Elotherium has but two metapodial bones, like the European. Also that the reviewer's illustrated articles in the AMERICAN NATURALIST are mostly of later date than the Vol. III Report U. S. Geol. Survey Terrs.—*E. D. Cope.*

GEOLOGICAL NEWS.—*General.*—M. E. Jourdy has found spirifers in the marble of the delta of Tonkin (Tonquin, Tong-king) and therefore concludes that this marble, which occurs both in Tonkin and Annam, is of Carboniferous age. At Dong-Song he has collected fossils which are of triassic age; while the plants of the coal-basin of Hone-Gay have been referred to the Rhætian period. According to these observations the Trias is, in the interior, superposed upon the Carboniferous, while the coast coal-measures of infra-Liassic age rest directly upon the carboniferous limestone in one of its folds. The actual coal-beds do not appear to extend beyond Dong-Trieu, but the strata are more extensive, and it is not unlikely that detached portions of coal may be found among the hills of arkoses which rise out of the rice-fields of the Delta. The beds of coal are thick upon the level of the soil, very little above the sea, and near to it, but the quality of the combustible is inferior.

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[1] System of Dentistry, Philadelphia, 1886.

Cretaceous.—Paul Pelseneer (Bull. du Mus. Roy. d' Hist. Nat. de Belgique) describes certain remains of a macrurous crustacean found in the green sand of Grandpré, in the Ardennes. From the sum of its characters it is clearly an Astacomorph, and the form of its rostrum (without lateral spines) places it in the genus Hoplopariæ. The new species is named *H. benedeni.* Comparison of Hoploparia with Homarus and Nephrops induces M. Pelseneer to consider it nearly related to the former genus.

Pliocene.—Sir R. Owen has recently described two species of saurians, allied to Megalania, from remains found on Lord Howe's island. Smaller than *Megalania prisca,* and with some differential characters, they form the genus Meiolania. Both species are toothless, with modifications of the jaws suggestive of a horny beak, but the cranial and vertebral characters are sauroid. Three pairs of horn-cones are present, with feeble traces of a seventh more advanced medial horn. The tail is long and stiff, its vertebræ encased in an osseous sheath developing tuberous processes corresponding with the vertebræ. Lord Howe's island is an insular tract six miles by one mile, situated midway between Sydney and Norfolk island. It consists of three raised basaltic masses connected by low-lying grounds of blown coral-sand.

MINERALOGY AND PETROGRAPHY.[1]

PETROGRAPHICAL NEWS.—In the June number of the *Geological Magazine* Professor Judd has an interesting article[2] in which he treats of the structure and origin of the little glassy balls known as Marekanite, from their occurrence—the great Marekanka, near Okhotsch, in Siberia. A résumé is given of the work previously done on the subject and some additional observations are recorded. According to Judd the internal structure of marekanite balls differs from that of Prince Rupert's drops in that they contain volatile ingredients in such quantity that when heated the entire mass

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[1] Edited by W. S. BAYLEY, Johns Hopkins University, Baltimore Md.

[2] On Marekanite and its Allies, p. 241.